Example Design/Review Checklist
Bioretention Practices

Plan Submission Date____________________
Project Name____
Site Plan/Permit Number____
Practice No./Location on Site____
Owner____ Phone Number_________________
BMP Designer_______________________________________ Phone Number_________________
General Contractor__________________________________ Phone Number_________________

______ **Signature and stamp of licensed professional design consultant and owner certification**

Plan Status

_______ Approved
_______ Not Approved

Legend:
___✓___ - Complete
__Inc.__ - Incomplete/Incorrect
__N/A__ - Not Applicable

Facility Type: Level 1 ____________________________ Level 2 ______________________________

Hydraulic Configuration:
- ☐ On-line facility
- ☐ Off-line facility

Type of Pre-Treatment Facility:
- ☐ Sedimentation chamber
- ☐ Plunge pool
- ☐ Stone diaphragm
- ☐ Grass filter strip
- ☐ Grass channel
- ☐ Other: ______________

I. SUPPORTING INFORMATION

_______ Provide a concise narrative describing the stormwater management strategy, describing how this practice fits into the overall plan, and stating all assumptions made in the design.
_______ Show the location of this BMP on the site map, including the following:
  ______ Facility area
  ______ Contributing drainage area (CDA) boundaries and acreage.
  ______ Embankment area
  ______ Delineation of FEMA 100-year floodplain (bioretention should be constructed *outside* the limits of the floodplain).
  ______ Areas of site compensated for in water quality calculations
_______ If the Bioretention facility will receive runoff from a hotspot land use, then an underdrain must be used.
_______ Bioretention facilities must not be located where they will receive regular dry weather flows or flow from sources such as sump pumps, irrigation water, chlorinated wash-water or swimming pool discharge, or other flows that are not stormwater runoff.
_______ Provide topography for the site area, showing that the slope of the CDA is between 1% and 5%.
_______ Provide a soil map for site and area of facility, showing CDA and facility boundaries
_______ Show the soil boring locations and provide the soil boring logs with Unified Soils Classifications and descriptions (at least one boring must be taken to confirm the underlying soil properties *at the depth where biofiltration or bioinfiltration is designed to occur,* to ensure that depth to the groundwater table/bedrock or karst is identified). HSG-B, C or D soils typically require an underdrain, whereas HSG-A soils generally do not.

_______ Provide the results of soil infiltration rate testing to confirm a minimum subsoil infiltration rate of > 0.5 inch/hour (> 1 inch/hour in order to avoid the use of an underdrain). The number of infiltration tests is based on the scale of the planned infiltration facility area – see Tables 9.2 and 9.3 in Stormwater Design Specification No. 9 and Appendix 8-A in Stormwater Design Specification No. 8).

_______ Confirm the depth to seasonal high groundwater table (minimum 2 ft. below the design bottom of the facility, or 1 ft. if in a coastal area and a large-diameter underdrain is used that only partially dewaters the bed)

_______ Confirm the depth to bedrock (minimum 2 ft. below the design bottom of the facility)

_______ If karst is present, a detailed geotechnical investigation is recommended to ensure the installation does not aggravate potential karst impacts (e.g., sinkholes, etc.) and an impermeable liner (recommend a min. 30 mil PVC Geo-membrane liner covered by 8 to 12 oz./sq. yd. non-woven geotextile) must be place beneath the bioretention facility. Where karst is present, there must be at least 3 feet of vertical separation between the bottom of the bioretention facility and the karst layer. Furthermore, only micro-scale or small-scale bioretention facilities not exceeding 20,000 sq. ft. may be used, and they must be designed *ONLY* to meet the Level 1 design criteria (incorporating an underdrain).

_______ Identify potential conflicts with other (existing?) structural components (pipes, underground utilities, etc.)

_______ Avoid installing geotextile filter fabric along the *bottom* of bioretention facilities (causes clogging).

II. COMPUTATIONS

A. Hydrology

_______ Determine the runoff curve numbers (pre- and post-developed conditions), providing the worksheets.

_______ Determine the time of concentration (pre- and post-developed conditions), providing the worksheets.

_______ Generate hydrographs (pre- and post-developed conditions) for appropriate design and safety storms (USDA-NRCS methods or modified rational-critical storm duration method)

_______ Urban Bioretention facilities, in particular, should be designed to fully drain within 24 hours following each storm.

B. Hydraulics

_______ Ensure that 4 to 5 feet of hydraulic head (3 to 5 feet for Urban Bioretention) are available above the bottom elevation needed to tie the underdrain into the storm drain system, in order to drive runoff through the filter bed. Less head is necessary for HSG-A soils.

_______ Specify assumptions and coefficients used.

_______ Provide a stage-storage table and curve

_______ Provide for large storm overflow or bypass

_______ Provide storm drainage and hydraulic grade line calculations.

C. Water Quality

_______ Provide a tabulation of land cover areas (impervious cover, managed turf, forest cover) in the CDA, pollutant load, pollutant load removal, and treatment volume requirements, all generated by using the Virginia Runoff Reduction Method spreadsheet (provide spreadsheet)

_______ Provide specific sizing/dimensions determined from criteria in Stormwater Design Specification No. 9.

III. PLAN REQUIREMENTS

A. BMP Plan View Information

_______ Show the limits of clearing and grading, noting that they should be identified and protected by acceptable signage, silt fence, snow fence, or other comparable barrier.

_______ Show the layout and dimensions of the bioretention facilities / planters. NOTE: The maximum contributing drainage area for a micro-bioretention facility (e.g., rain garden) is 0.5 acre (3% of the CDA or 5% of the roof area for Level 1 or 4% of the CDA or 6% of the roof area for Level 2); for an urban bioretention facility is 2,500 sq. ft., and for a conventional bioretention facility is 2.5 acres.

_______ Observe proper setbacks from building foundations, down-gradient slopes, etc.:

- ______ 5 feet down-gradient from wet utility lines. NOTE: Dry utility lines (e.g., gas, electric, cable and telephone, etc.) may cross under bioretention areas if they are double-cased.
- ______ 10 feet down-gradient from building foundations for urban bioretention. NOTE: If the facility is lined and an underdrain is used, there is no minimum setback requirement.
- ______ 5 feet down-gradient and 25 feet up-gradient from building foundations for micro-scale (rain garden) facilities
- ______ 10 feet down-gradient and 50 feet up-gradient from building foundations for standard bioretention facilities with a 0.5 acre or smaller CDA
- ______ 25 feet down-gradient and 100 feet up-gradient from building foundations for standard bioretention facilities with a CDA of between 0.5 to 2.5 acres.
- ______ If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. NOTE: A special footing or drainage design may be used to justify a reduction of the setbacks noted above.
- ______ In cold climate areas, 25 feet from roadways to prevent potential frost heaving of the pavement
- ______ 100 feet from any water supply well (50 feet if the biofilter is lined)

_______ Design Urban Bioretention, in particular, to minimize interference with pedestrian traffic and allow for frequent landscape and facility maintenance

_______ Geometry:

- ______ Level 1: Length of the shortest flow path/overall length = 0.3 *OR* other design methods are used to prevent short-circuiting; a one-cell design (not including the pre-treatment cell.
- ______ Level 2: Length of the shortest flow path/overall length = 0.8 *OR* other design methods are used to prevent short-circuiting; a two-cell design (not including the pre-treatment cell.

_______ Show the location of all conveyance system outfalls (inlets) into the facility with pre-treatment and outlet protection designed in accordance with the VE&SCH

_______ Ensure the proper geometry and orientation of the facility and inlets to the facility to avoid short-circuiting

_______ Show the top-of-bank and basin bottom elevations

_______ Show the treatment volume and maximum water surface elevations for all appropriate design storms and safety storms

_______ Show the location of the underdrain, if applicable

_______ Ensure and show adequate maintenance access to the facility

_______ Show the location of the observation well

B. BMP Section Views & Related Details

1. Micro-Bioretention Facility (Rain Garden)

_______ Pre-treatment:

- ______ Level 1: External (leaf screens, grass filter strip, energy dissipators, etc.)
- ______ Level 2: External *plus* a grass filter strip

_______ Inflow: From sheet flow or a roof leader

_______ Facility may be a single-cell design (can be divided into smaller cells at downspout locations)

_______ Maximum ponding depth: 6 inches.

_______ Show the elevations of treatment volume and maximum design water surface elevations for all appropriate design storms and safety storms

_______ Show the facility rim elevations: constructed height and settled height (allowing for 10% settlement).

_______ Ensure adequate freeboard

_______ Provide a typical grading section through the facility
_______ Filter media:
  ______ Depth: minimum 18 inches for Level 1; minimum 24 inches for Level 2; recommended maximum depth is 36 inches for both.
  ______ Media mixed on site or supplied by vendor for Level 1, but *must* be supplied by vendor for Level 2
  ______ P-index: Between 20 and 30 for a media mix, *OR* between 7 and 21 mg/kg of P in the soil media (see Section 6.6 of Stormwater Design Specification No. 9)
  ______ Cation Exchange Capacity (CEC): Soils with a CEC exceeding 10 are preferred for pollutant removal.
  ______ Infiltration Rate: Between 1 to 2 inches per hour
  ______ Media mix: Equivalent to loamy sand, with the following composition:
    ______ 85% to 88% sand
    ______ 8% to 12% soil fines
    ______ 3% to 5% organic matter
  ______ Mulch cover: 2 to 3-inch layer composed of shredded, aged hardwood bark mulch
_______ Underdrain:
  ______ Level 1: Corrugated HDPE or equivalent
  ______ Level 2: Corrugated HDPE or equivalent, with a minimum 6-inch stone sump below the invert; *OR* none, if soil infiltration requirements are met
  ______ A minimum of 3 inches of VDOT #57 clean washed stone (less than 1% passing a #200 sieve) must be laid and packed above and below the pipe.
_______ Cleanouts are *not* needed
_______ In cold climates (winter or otherwise) it is advisable to extend the filter bed and underdrain pipe below the frost line and/or oversize the underdrain by on pipe size to reduce the potential for freezing.
_______ Vegetation:
  ______ Level 1: Turf or herbaceous cover (alternative to mulch), or shrubs (minimum 1 of these 3 choices)
  ______ Level 2: Turf or herbaceous cover (alternative to mulch), shrubs, or trees (minimum 2 of these 4 choices)

2. Standard Bioretention Filter or Bioretention Basin

_______ Pre-treatment:
  ______ Level 1: A pre-treatment cell, grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment device.
  ______ Level 2: A pre-treatment cell *plus* one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment device.
_______ Inflow: From sheet flow, curb cuts, trench drains, concentrated flow, or the equivalent
_______ Maximum ponding depth: 6 inches (preferred) to 12 inches. NOTE: Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection.
_______ Show the elevations of treatment volume and maximum design water surface elevations for all appropriate design storms and safety storms
_______ Show the facility rim elevations: constructed height and settled height (allowing for 10% settlement).
_______ Ensure adequate freeboard
_______ Provide a typical grading section through the facility
_______ Filter media:
  ______ Depth: minimum 24 inches for Level 1; minimum 36 inches for Level 2; recommended maximum depth is 6 feet for both.
  ______ Media mixed on site or supplied by vendor for Level 1, but *must* be supplied by vendor for Level 2
  ______ P-index: Between 20 and 30 for a media mix, *OR* between 7 and 21 mg/kg of P in the soil media (see Section 6.6 of Stormwater Design Specification No. 9)
  ______ Cation Exchange Capacity (CEC): Soils with a CEC exceeding 10 are preferred for pollutant removal.
  ______ Infiltration Rate: Between 1 to 2 inches per hour

______ Media mix: Equivalent to loamy sand, with the following composition:

______ 85% to 88% sand

______ 8% to 12% soil fines

______ 3% to 5% organic matter

______ Mulch cover: 2 to 3-inch layer composed of shredded, aged hardwood bark mulch

_______ Underdrain:

______ Level 1: Schedule 40 PVC with clean-outs

______ Level 2: Schedule 40 PVC with clean-outs *and* with a minimum 12-inch stone sump below the invert; *OR* none, if soil infiltration requirements are met

______ A minimum of 3 inches of VDOT #57 clean washed stone (less than 1% passing a #200 sieve) must be laid and packed above and below the pipe.

_______ In cold climates (winter or otherwise) it is advisable to extend the filter bed and underdrain pipe below the frost line and/or oversize the underdrain by on pipe size to reduce the potential for freezing.

_______ Conveyance and Overflow:

______ For on-line bioretention: Incorporate an overflow structure to safely convey larger storms through the bioretention area. The following criteria apply to overflow structures:

______ The overflow associated with the 2-year and 10-year design storms should be controlled so that velocities are non-erosive at the outlet point (to prevent downstream erosion)

______ Common overflow systems within bioretention practices consist of an inlet structure, where the top of the structure is placed at the maximum water surface elevation of the bioretention area, which is typically 6 to 12 inches above the surface of the filter bed (6 inches is preferred).

______ The overflow capture device (typically a yard inlet) should be scaled to the application; this may be a landscape grate inlet or a commercial-type structure.

______ The filter bed surface should generally be flat so the bioretention area fills up like a bathtub.

______ For off-line bioretention (preferred): Create an alternate flow path at the inflow point into the structure so that when the maximum ponding depth is reached, the incoming flow is diverted past the facility (so that the excess flows do not pass over the filter bed and through the facility, but additional flow is able to enter as the ponding water filters through the soil media).

_______ Vegetation:

______ Level 1: A planting template to include turf or herbaceous cover (alternative to mulch), shrubs, and/or trees to achieve surface area coverage of at least 75% within 2 years.

______ Level 2: A planting template to include turf or herbaceous cover (alternative to mulch), shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, it must be combined with other vegetation.

3. Urban Bioretention (planters, etc.)

_______ Pre-treatment (keep in mind the aesthetic qualities of the visible materials):

______ A pre-treatment cell, grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment device.

______ A trash rack between the pre-treatment cell and the main filter bed, allowing trash to be collected from a single location.

______ Trash racks across curb cuts, keeping trash in the gutter, accessible to street-sweeping equipment.

______ A pre-treatment area above the ground or a manhole or removable grate directly over the pre-treatment area.

_______ Inflow: From sheet flow, curb cuts, trench drains, roof drains, concentrated flow, or the equivalent

_______ Inlets should be stabilized with VDOT #3 stone, a splash block, river stone, or another acceptable energy dissipation measure.

_______ Surface slope: 1% toward the outlet, unless a stormwater planter is used.

_______ Maximum ponding depth: 6 inches (preferred) to 12 inches. NOTE: Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection.

_______ Filter media:
- ______ Depth: minimum 30 inches; recommended maximum depth is 4 feet. NOTE: If large trees and shrubs are planted, the *minimum* depth should be 4 feet.
- ______ Media mixed on site or supplied by vendor for Level 1, but *must* be supplied by vendor for Level 2
- ______ P-index: Between 20 and 30 for a media mix, *OR* between 7 and 21 mg/kg of P in the soil media (see Section 6.6 of Stormwater Design Specification No. 9)
- ______ Cation Exchange Capacity (CEC): Soils with a CEC exceeding 10 are preferred for pollutant removal.
- ______ Infiltration Rate: Between 1 to 2 inches per hour
- ______ Media mix: Equivalent to loamy sand, with the following composition:
  - ______ 85% to 88% sand
  - ______ 8% to 12% soil fines
  - ______ 3% to 5% organic matter
- ______ Filter media in a box should be extended from one wall to within 6 inches of the opposite wall, and it may be centered in the box or offset to one side.
- ______ Filter media must be separated from the soil by non-woven geotextile fabric or a 2 to 3 inch layer of either washed VDOT #8 stone or 1/8 to 3/8-inch pea gravel.
- ______ Mulch cover: 2 to 3-inch layer composed of shredded, aged hardwood bark mulch.

_______ Waterproof stormwater planters near building foundations by using a watertight concrete shell or an impermeable liner, to prevent seepage.

_______ Expanded tree pits:
- ______ The bottom of the soil/media layer must be a minimum of 4 inches below the root ball of trees and shrubs being planted.
- ______ Where portions of extended tree pits are covered with permeable pavers or cantilevered sidewalks, ensure the filter media is connected beneath these surfaces so roots can share the space.
- ______ Installing a removable tree pit grate (capable of supporting H-20 axel loads) over the filter bed media can prevent pedestrian traffic and trash accumulation.
- ______ Low, wrought iron fences can help restrict pedestrian traffic across the tree pit bed and protect pedestrians where there is a drop-off from the sidewalk to the bioretention cell.
- ______ Each tree needs a minimum of 400 cubic feet of shared root space.

_______ Stormwater Curb Extensions: It may be necessary to provide a barrier to keep water from saturating the adjacent road or street's sub-base and ensure it continues to be capable of supporting H-20 axel loads.

_______ Underdrain:
- ______ Slotted Schedule 40 PVC pipe greater than 4 inches in diameter, with clean-outs.
- ______ A minimum of 2 inches of VDOT #57 clean washed stone (less than 1% passing a #200 sieve) must be laid and packed above and below the pipe.
- ______ Minimum underdrain pipe slope is 0.5%.

_______ Overflows can either be diverted from entering the bioretention cell or dealt with via an overflow inlet. Optional methods include:
- ______ Curb openings sized to capture only the treatment volume and bypass higher flows through the existing gutter.
- ______ Landscaping-type inlets or standpipes with trash guards.
- ______ A pre-treatment chamber with a weir design that limits flow to the filter bed area.

_______ Any grates used above Urban Bioretention areas must be removable to allow maintenance access.

_______ Stencil or otherwise permanently mark each Urban Bioretention unit as a "stormwater management facility," indicating that (1) it has a water quality protection purpose, (2) it may pond briefly after a storm, and (3) it is not to be disturbed except for required maintenance.

_______ Vegetation:
- ______ Urban Bioretention cells can vary from formal gardens or naturalized landscapes, depending on the degree of landscape maintenance that can be provided
- ______ Where less frequent maintenance may be available and trash accumulation is a concern, use a "turf and trees" landscape model, perhaps including some herbaceous flowering plants.

______ Choose native trees and shrubs known to be hearty in the polluted air and compacted soils of urban settings, although some ornamental species can be used.

______ Selected vegetation must be tolerant of road salts, drought, and inundation.

C. Landscape Plan

_______ Consider the importance of aesthetics and visual characteristics (foliage form, texture, color, etc.)

_______ Consider visibility, traffic considerations and other safety issues

_______ Provide a planting schedule and specifications (transport / storage / installation / maintenance)

_______ Plant selection should be appropriate for the site's vegetation climatic zone (4-8 in Virginia), emphasizing native species

_______ Check whether future tree canopy heights associated with Urban Bioretention practices will interfere with existing overhead utility lines.

_______ Specify preservation measures for existing vegetation

_______ The construction contract should include a *Care and Replacement Warranty* that specifies a minimum survival for species planted of 75% after the first growing season, and a minimum effective ground cover of 75% for flat roofs and 90% for pitched roofs.

D. Ecological Considerations

_______ Consider sun and wind exposure

_______ Consider the effects upon bioretention area from adjacent plant communities

_______ Wildlife benefits appropriate for the location may be included in plant material layout

_______ Consider any insect and disease infestation at or near the facility site

E. Construction Notes

_______ Planned bioretention areas should be clearly marked off and remain *outside* the limits of land disturbance during construction to prevent soil compaction by heavy equipment.

_______ Bioretention areas *may* be used during construction as sites for temporary sediment traps or basins, provided the construction plans include notes and graphical details specifying the following:

______ The maximum excavation depth at the construction stage must be at least 1 foot above the post-construction installation.

______ The facility must contain an underdrain.

______ Showing the proper procedures for converting the temporary sediment controls to a permanent bioretention facility, including dewatering, cleanout and stabilization.

_______ Provide traffic control to avoid tracking mud and fine sediment into the facility and compacting the soil.

_______ Store materials in a protected area to keep them free from mud, dirt and other foreign materials.

______ Obtain filter media from an approved vendor and store it on an adjacent impervious area or on plastic sheeting.

_______ Where any Urban Bioretention facilities are constructed in the road or right-of-way, the construction sequence may need to be adjusted to account for traffic control, pedestrian access and utility notification.

_______ Construction sequence:

______ Construction inspections should occur before, during and after installation to ensure the bioretention facility is constructed according to specifications.

______ Use detailed inspection checklists that require sign-offs by qualified individuals at critical states of construction, to ensure the contractor's interpretation of the plan is consistent with the designer's intent.

______ Check the proposed site for existing utilities prior to any excavation.

______ The designer and the installer/contractor should have a pre-construction meeting, checking the boundaries of the CDA and the actual inlet elevations to ensure they conform to the original design.

______ The designer should clearly communicate, in writing, any project changes determined during the pre-construction meeting to the installer and the plan review/inspection authority.

- ______ Construction of the bioretention facility should begin only *after* site work is completed and the entire contributing drainage area has been stabilized with dense and healthy vegetation.
- ______ It may be necessary to block certain curb or other inlets while the bioretention area is being constructed.
- ______ Temporary E&S control measures (typically silt fence, diversion berms, EC fabric, etc.) to prevent sediment from moving into the filter media or stone base material during construction), to avoid clogging (particularly if the practice relies on infiltration), and to protect the facility's vulnerable side slopes from erosion during construction.
- ______ Ensure that pre-treatment structures are properly installed and working effectively.
- ______ Excavators or backhoes (with arms with adequate extension) should work from the sides to excavate the reservoir layer to its appropriate design depth and dimensions.
    - ______ Contractors should use a cell construction approach in larger bioretention basins, with the basin split into 500 to 1,000 sq. ft. temporary cells with a 10 to 15 foot earth bridge in between each cell, so that cells can be excavated from the side.
    - ______ The floor of the facility should be completely level, but equipment should be kept off the floor to prevent soil compaction.
    - ______ It may be necessary to rip the bottom soils to a depth of 6 to 12 inches to promote greater infiltration.
- ______ Correctly install geotextile fabric on the excavation sides.
    - ______ Trim large tree roots flush with the sides of the excavation to prevent puncturing or tearing of the filter fabric.
    - ______ When laying out the geotextile, the width should include sufficient material to compensate for perimeter irregularities in the trench and for a 6-inch minimum overlap at the top of the excavation.
    - ______ Place stones or other anchoring objects on the fabric at the trench sides to keep the trench open during windy periods.
    - ______ Place natural soils in any voids that occur between the fabric and the excavated sides of the trench, to ensure the fabric conforms smoothly to the sides of the excavation.
- ______ Install and anchor the observation well(s) and, if used, install the underdrains.
    - ______ Check aggregate material prior to installation to confirm that it is clean and washed and meets specifications and is installed to the correct depth
    - ______ Check elevations (underdrain inverts, inflow and outflow point inverts, depth of aggregate installations, etc.) and the surface slope.
    - ______ Provide the correct depth and type of aggregate above and below the underdrains.
    - ______ Underdrains should slope down towards the outlet at a grade of 0.5% or steeper.
    - ______ Up-gradient ends of underdrains in the reservoir layer should be capped, but *not* the downstream ends.
    - ______ Where an underdrain pipe is connected to a structure, there must be *no* perforations within 1 foot of the structure.
    - ______ Ensure there are no perforations in clean-outs and observation wells within 1 foot of the surface.
- ______ Place approximately 3 inches of choker stone/pea gravel on the stone above the underdrain(s) as a filter between the underdrain stone layer and the soil filter media.
- ______ Place the filter media by hand (to avoid compaction and maintain porosity) in 12-inch lifts, with no machinery allowed directly on the media surface during or after construction, until the design top elevation is achieved.
    - ______ Overfill the media above the proposed finished surface elevation to allow for natural settling. Lifts may be lightly watered to encourage settling.
    - ______ After the final lift is placed, rake the media to level it, saturate it, and allow it to settle for at least one week prior to installing plant materials. Check for settlement and add additional media, if needed, to achieve the design elevation.
- ______ Prepare planting holes for any trees and shrubs, install the vegetation, and water accordingly.
- ______ Install any temporary irrigation equipment.

______ Place the surface cover in the bioretention cells (mulch, river stone or turf), depending on the design.

______ If coir or jute matting will be used instead of mulch, the matting will need to be installed prior to planting, and holes or slits will have to be cut in the matting to install the plants.

______ Install the plant materials as shown in the landscaping plan, and water them during weeks of no rain for the first two months following installation.

______ The construction contract should include a *Care and Replacement Warranty* to ensure that vegetation is properly established and survives during the first growing season following construction.

______ Implement any remaining permanent stabilization measures.

______ Log the GPS coordinates for each facility and submit them for entry into the local BMP maintenance tracking database.

E. Maintenance Items (can include BMP Operation & Maintenance Inspection Checklists from Chapter 9, Appendix 9-C of this Handbook)

_______ Provide a Maintenance Agreement, indicating the person or organization responsible for maintenance, authorizing access for inspections and maintenance, and including a maintenance inspection checklist.

______ Include a Maintenance Narrative which describes the long-term maintenance requirements of the facility and all components, including removal and disposal of trash, debris and sediment accumulations, periodic replacement of soil media, care of the vegetation, and mowing.

_______ Record a deed restriction, drainage easement, and/or other enforceable mechanism, including GPS coordinates of the area, to ensure the bioretention areas are not disturbed or converted to other uses.

_______ Provide sufficient facility access from the public ROW or roadway to both the bioretention facility and any pre-treatment practices.

IV. COMMENTS

By: ______________________ Date: ______________